Geographical Sciences

Department Website: http://geography.uchicago.edu

PROGRAM OF STUDY

The discipline of geography contributes to an understanding of society by exploring the Earth's environment and its interactions with human life, by inquiring into cultures and societies from the perspective of area study, and by investigating problems of spatial organization. The BA program in geographical sciences offers a distinctive focus for general education and provides a background both for advanced specialization in the discipline and for study in other fields. Solid grounding in modern geography can lead to careers in government service, environmental consulting, marketing, publishing, planning, and teaching at all levels.

PROGRAM REQUIREMENTS

The geographical sciences major is on hold for revision and will not be accepting new major declarations from first- or second-year students in the 2021–22 academic year. Students interested in the geographical sciences program should contact Jamie Gentry (jagentry@uchicago.edu) for additional information.

The BA degree in geographical sciences calls for the satisfactory completion of eleven courses, at least eight of which must be in geographical sciences. These include an introduction to Geographic Information Systems/GIS (GEOG 28202 Geographic Information Science I); the senior seminar (GEOG 29800 Senior Seminar); and at least nine additional geography courses, up to three of which may be in approved related fields. A BA thesis is prepared in connection with the senior seminar.

Summary of Requirements: BA in Geographical Sciences

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 28202</td>
<td>Geographic Information Science I</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Nine additional geographical sciences courses; up to three may be in approved related fields</td>
<td>900</td>
</tr>
<tr>
<td>GEOG 29800</td>
<td>Senior Seminar</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>BA thesis</td>
<td></td>
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<tr>
<td></td>
<td>Total Units</td>
<td>1100</td>
</tr>
</tbody>
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GRADING

All courses counted toward the geographical sciences major must be taken for quality grades.

HONORS

Honors are awarded to students with an overall GPA of 3.0 or higher who submit a BA thesis that is judged to be outstanding.

MINOR IN GEOGRAPHIC INFORMATION SCIENCE

Spatial thinking deals with the fundamental role of space, place, location, distance, and interaction—crucial to tackling many research questions in the social and physical sciences. The minor in geographic information science provides a coherent exposure to rigorous spatial thinking and its expression through the theories and methods of geographic information science.

Geographic information science covers all aspects pertaining to accessing, storing, transforming, manipulating, visualizing, exploring, and reasoning about information where the locational component is important (spatial data). This includes the technical and computational aspects of geographic information systems, the methodologies of spatial analysis and spatial statistics, mapping, and geo-visualization, as well as societal aspects related to the use of geographic data.

The minor serves as a complement to other majors, such as computer science, statistics, economics, public policy studies, sociology, anthropology, political science, or environmental and urban studies, but would also be of value to majors in the humanities and physical sciences interested in the spatial aspects of their field.

The courses in the minor are open to geographical sciences majors, but the minor cannot be taken concurrently with a geographical sciences major.

Program Requirements for the Minor

The minor consists of six core courses and one elective from a series of offerings. The core courses provide a coherent exposure to rigorous spatial thinking and its incorporation into the methodologies of geographic information systems, spatial analysis, and spatial data science.

The electives consist of courses that touch upon various aspects of spatial thinking, with different degrees of technical materials, and are intended to either act as “gateways” into the minor or to provide the opportunity for the application of spatial analysis in a range of fields.

The sequencing of courses is designed such that students can complete all requirements for the minor in one year of study (provided the statistics prerequisite has been taken prior).

The capstone course for the minor is GEOG 28000 GIScience Practicum, which may be taken concurrently with GEOG 28602 Geographic Information Science III. Students will develop a multifaceted GIS project.
incorporating spatial thinking in design, infrastructure, and implementation. Projects could include the development of a web application, dynamic dashboard, interactive storytelling map, infographic-driven policy brief, or research article, and can be carried out in conjunction with a thesis requirement of the student’s major.

Summary of Requirements: Minor in Geographic Information Science

<table>
<thead>
<tr>
<th>Course Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>GEOG 28202</td>
<td>Geographic Information Science I</td>
<td>100</td>
</tr>
<tr>
<td>GEOG 28402</td>
<td>Geographic Information Science II</td>
<td>100</td>
</tr>
<tr>
<td>GEOG 28602</td>
<td>Geographic Information Science III</td>
<td>100</td>
</tr>
<tr>
<td>GEOG 28000</td>
<td>GIScience Practicum</td>
<td>100</td>
</tr>
<tr>
<td>GEOG 20500</td>
<td>Introduction to Spatial Data Science</td>
<td>100</td>
</tr>
<tr>
<td>STAT 22000</td>
<td>Statistical Methods and Applications (or equivalent) *</td>
<td>100</td>
</tr>
</tbody>
</table>

Any elective from the list of courses below                                     100

Total Units                                                                700

Note: Many GEOG courses are also cross-listed with SOCI and ENST.

* Students who take STAT 22000 to satisfy a requirement in a major will complete a six course minor.
  Students who take STAT 22000 to satisfy only the GIS minor will complete a seven course minor.

Elective Options for the Minor in Geographic Information Science

One of the following courses may be taken to fulfill the elective course option for the minor in geographic information science.

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENST 24600</td>
<td>Introduction to Urban Sciences</td>
<td>100</td>
</tr>
<tr>
<td>ENST 26006</td>
<td>Sustainable Cities Lab</td>
<td>100</td>
</tr>
<tr>
<td>ENST 27155</td>
<td>Urban Design with Nature</td>
<td>100</td>
</tr>
<tr>
<td>GEOG 24700</td>
<td>Introduction to Urban Planning</td>
<td>100</td>
</tr>
<tr>
<td>GEOG 25900</td>
<td>Introduction to Location Analysis</td>
<td>100</td>
</tr>
<tr>
<td>GEOG 28700</td>
<td>Readings in Spatial Analysis</td>
<td>100</td>
</tr>
<tr>
<td>GEOG 28702</td>
<td>Introduction to GIS and Spatial Analysis</td>
<td>100</td>
</tr>
<tr>
<td>GEOG 28800</td>
<td>History of Cartography</td>
<td>100</td>
</tr>
<tr>
<td>GEOG 28900</td>
<td>Readings in Urban Planning and Design</td>
<td>100</td>
</tr>
<tr>
<td>SOCI 20273</td>
<td>Urban Spatial Archaeology I</td>
<td>100</td>
</tr>
<tr>
<td>SOCI 20519</td>
<td>Spatial Cluster Analysis</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: many GEOG courses are also cross-listed with SOCI and ENST.

Advising and Grading

Courses in the minor may not be double counted with the student’s major(s), other minors, or general education requirements. For students who have taken STAT 22000 (or equivalent) as a requirement for another major, minor, or general education requirement, an approved elective must replace that requirement.

Courses in the minor must be taken for quality grades, and more than half of the requirements for the minor must be met by registering for courses bearing University of Chicago course numbers.

The courses in the minor are open to geographical sciences majors, but the minor cannot be taken concurrently with a geographical sciences major.

Students who elect the minor must meet with the program director before the end of Spring Quarter of their third year to declare their intention to complete the minor. The director’s approval for the minor program should be submitted to the student’s College adviser by the deadline above using the Consent to Complete a Minor Program (https://humanities-web.s3.us-east-2.amazonaws.com/college-prod/s3fs-public/documents/Consent_Minor_Program.pdf) form available from the College adviser or online.

Students may petition the program director to have a course counted as an elective that is not included on the current list of electives.

GEOG 23500. Urban Geography. 100 Units.

This course examines the spatial organization and current restructuring of modern cities in light of the economic, social, cultural, and political forces that shape them. It explores the systematic interactions between social process and physical system. We cover basic concepts of urbanism and urbanization, systems of cities urban growth,
migration, centralization and decentralization, land-use dynamics, physical geography, urban morphology, and planning. Field trip in Chicago region required. This course is part of the College Course Cluster, Urban Design.

Instructor(s): M. Conzen
Terms Offered: Winter 2021-22

Note(s): This course offered in even years.
Equivalent Course(s): GEOG 33500, ARCH 24660, ENST 24660

GEOG 25012. Undergraduate research seminar: Chicago Urban Morphology. 100 Units.
This seminar is open to Seniors and Juniors, particularly for but not necessarily limited to those in the fields of geography, environmental science, and urban studies. It is designed for students to undertake original research on a topic of their own choosing within the broad scope of Chicago's built environment. Following a brief reading course in the theoretical literature of urban morphology, each student will identify and select a topic of interest to research using Chicago sources, with the objective of a formal written research paper. Discussions will center around formulating research questions, theoretical underpinnings, suitable methodology, modes of writing, appropriate presentation of evidence, and effective illustration. Sessions will combine open discussion with a rotating series of periodic individual progress reports to the group, reflecting an interesting diversity of topics and mutual support in gaining experience in the research process.

Instructor(s): Michael Conzen
Terms Offered: Winter
Equivalent Course(s): CHST 25012, SOCI 20552, PBPL 25012, ENST 25012, ARCH 25012

GEOG 25424. GIS and Human Ecologies. 100 Units.
Floods, wildfires, deforestation, urban sprawl, agricultural expansion: environmental processes like these have dramatic effects unequally distributed across space. As such, interrogating the social consequences of these processes demands spatial thinking. This course introduces students to how researchers in the social sciences use Geographic Information Systems (GIS) to analyze interactions between humans and the environment. In this class we will critically examine GIS as a way of knowing and representing interactions between humans and the natural world: What are the advantages and limits of spatial data sets? How does using GIS structure the questions researchers ask? How does it make possible new questions? What are the limits of a GIS analysis?
In this course, students with an existing foundation in GIS will develop the investigative skills to use ArcGIS software to answer complex research questions. Through in-class exercises and course readings students will learn to move beyond using GIS to represent data and instead treat it as a tool for evaluating social science research questions. Over the course of the quarter, students will build on assignments to develop their own analytical research project from start to finish, beginning with data procurement and concluding with a final presentation of results.

Instructor(s): Sandy Hunter
Terms Offered: Winter
Equivalent Course(s): GLST 25424, PBPL 25424, ENST 25424

GEOG 26100. Roots of the Modern American City. 100 Units.
This course traces the economic, social, and physical development of the city in North America from pre-European times to the mid-twentieth century. We emphasize evolving regional urban systems, the changing spatial organization of people and land use in urban areas, and the developing distinctiveness of American urban landscapes. All-day Illinois field trip required. This course is part of the College Course Cluster, Urban Design.

Instructor(s): M. Conzen
Terms Offered: Autumn. Offered 2021-22

Note(s): This course offered in odd years.
Equivalent Course(s): ARCH 26100, HIST 28900, HIST 38900, GEOG 36100, ENST 26100

GEOG 27100. Cartographic Design and Geovisualization. 100 Units.
This course is a hands-on introduction to core principles and techniques associated with cartographic design, especially with regards to digital map design and the geographic visualization of data. Main topics include map generalization, symbology, scale, visual variables, scales of measurement, 2D and 3D design, map animation and interaction, and web mapping. Students will work with open-source GIS software and web tools, culminating in a final project and peer critique.

Instructor(s): Crystal Bae
Terms Offered: Winter 2021-22

Equivalent Course(s): GEOG 37100

GEOG 28000. GIScience Practicum. 100 Units.
This applied course in geographic information science builds upon and refines knowledge and geocomputational expertise gained in the GIScience sequence. Students will develop multifaceted GIS project incorporating spatial thinking in design, infrastructure, and implementation. Projects could include the development of a web application, dynamic dashboard, interactive storytelling map, infographic-driven policy brief, or research article and are encouraged to link additional disciplines like health, sociology, economics, or political science.

Terms Offered: Spring 2021-22

Prerequisite(s): Students must complete GEOG 28202/38202 Geographic Information Science I; GEOG 28402/38402 Geographic Information Science II; and GEOG 20800/30800 Introduction to Spatial Data Science before taking this course.

Equivalent Course(s): GEOG 38000

GEOG 28202. Geographic Information Science I. 100 Units.
This course introduces students to a wide range of geospatial technologies and techniques in order to explain the basic theory and application of geographic information systems (GIS). To do this, students will use open source or free software such as QGIS and Google Earth Pro to complete GIS lab exercises that cover a range of
Geographical Sciences

topics, including an introduction to different types of geospatial data, geographic measurement, GIS, principles of cartography, remote sensing, basic GIS mapping and spatial analysis techniques, remote sensing, and specific geospatial applications such as 3D modeling and geodesign. By providing a general overview of geospatial technologies, this course provides students with a broad foundational knowledge of the field of GIScience that prepares them for more specialized concepts and applications covered in future GIS courses.

Terms Offered: Autumn. Offered 2021-22
Equivalent Course(s): ARCH 28202, GEOG 38202

GEOG 28402. Geographic Information Science II. 100 Units.
This course investigates the theory and practice of infrastructure and computational approaches in spatial analysis and GIScience. Geocomputation is introduced as a multidisciplinary systems paradigm necessary for solving complex spatial problems and facilitating new understandings. Students will learn about the elements of spatial algorithms and data structures, geospatial topologies, spatial data queries, and the basics of geodatabase architecture and design.
Instructor(s): Marynia Kolak Terms Offered: Winter 2021-22
Prerequisite(s): GEOG 28202 /GEOG 38202. Students must receive a grade of C or higher in GEOG 38202 in order to register for this course.
Equivalent Course(s): GEOG 38402, ARCH 28402

GEOG 28602. Geographic Information Science III. 100 Units.
This advanced course extends and connects both foundational and functional GIScience concepts. Students will be introduced to advanced programming and scripting languages necessary for spatial analysis and GIScience applications. Additional topics include customization, enterprise GIS, web GIS, and advanced visualization and analytic techniques.
Instructor(s): M. Kolak Terms Offered: Spring 2021-22
Prerequisite(s): GEOG 38202 and GEOG 38402. Students must receive a grade of C or higher in GEOG 28402/ GEOG 38402 in order to register for this course.
Equivalent Course(s): GEOG 38602, ARCH 28602

GEOG 28700. Readings in Spatial Analysis. 100 Units.
This independent reading option is an opportunity to explore special topics in the exploration, visualization and statistical modeling of geospatial data.
Instructor(s): M. Kolak Terms Offered: Autumn Spring Winter 2021-22
Note(s): This course is consent-only. Students are required to submit the College Reading and Research Course Form. Available for either quality grades or for P/F grading.
Equivalent Course(s): GEOG 38700, ENST 28800

GEOG 28702. Introduction to GIS and Spatial Analysis. 100 Units.
This course provides an introduction and overview of how spatial thinking is translated into specific methods to handle geographic information and the statistical analysis of such information. This is not a course to learn a specific GIS software program, but the goal is to learn how to think about spatial aspects of research questions, as they pertain to how the data are collected, organized and transformed, and how these spatial aspects affect statistical methods. The focus is on research questions relevant in the social sciences, which inspires the selection of the particular methods that are covered. Examples include spatial data integration (spatial join), transformations between different spatial scales (overlay), the computation of “spatial” variables (distance, buffer, shortest path), geovisualization, visual analytics, and the assessment of spatial autocorrelation (the lack of independence among spatial variables). The methods will be illustrated by means of open source software such as QGIS and R.
Instructor(s): M. Kolak Terms Offered: Spring Summer 2021-22
Equivalent Course(s): SOCI 30283, ENST 28702, ARCH 28702, GEOG 38702, SOCI 20283

GEOG 29100. Undergraduate Tutorial. 100 Units.
This course is intended for individual study of selected geographical problems.
Terms Offered: Autumn Winter 2021-22
Prerequisite(s): Instructor consent required.
Note(s): Available for either quality grades or for P/F grading.

GEOG 29700. Readings in Special Topics in Geography. 100 Units.
A program of supervised reading of a special topic in geography. Students will meet periodically with the instructor to discuss the readings, and submit a final paper critically reviewing the conceptual orientation and substantive content of the readings.
Instructor(s): M. Conzen, L. Anselin, E. Talen. Terms Offered: Autumn Spring Winter 2021-22
Prerequisite(s): Instructor consent required.
Note(s): Consent of instructor. Students are required to submit the College Reading and Research Course Form. Available for either quality grades of for P/F grading.

GEOG 29800. Senior Seminar. 100 Units.
This course is designed for development of the BA thesis.
Terms Offered: Winter 2021-22
Prerequisite(s): Open to students with fourth-year standing who are majoring in geographical studies.
Note(s): Must be taken for a quality grade.